

Storage behavior of the endangered alpine conifer *Abies nephrolepis* Maxim.

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INTRODUCTION

- *Abies nephrolepis* Maxim. is an endangered alpine coniferous species distributed in the alpine regions of Korea, and it is a species that must be preserved both in-situ and ex-situ.
- However, the storage behaviors of the seeds have not been confirmed, and it is not clear whether they can be stored under long-term storage conditions (-20°C, RH40% or less).
- According to the storage behaviors of the seeds, it is possible to determine whether the seeds can be stored under long-term storage behaviors.
- This study was carried out to confirm the storage behaviors for the safe storage seeds under long-term storage conditions.



Fig 1. *Abies nephrolepis* Maxim.

MATERIALS AND METHODS

- The seeds were collected from plants growing at Mt. Balwang on September 2019. After collection, the equilibrium relative humidity (eRH) of the seeds was measured.

Germination test

- X-ray test
 Filled rate(%) = the number of filled seeds/total number of seeds × 100
- Germination test
 Under 10 different temperature conditions
- Germination percentage(%) = the number of germinated seeds / total number of seeds × 100

Tetrazolium test

- Use 1% tetrazolium solution
 Determine viable · nonviable seed according to dying status

Desiccation tolerance

- Drying 15,20,30,40,50% relative humidity at 15°C using LiCl solution
- Determine moisture content and viability assay by 15, 20, 30, 40, 50% eRH

Moisture contents

- When the moisture equilibrium is reached, measure the equilibrium relative humidity using a hygrometer and drying 103°C, 17hr method according to the National seed resources seed inspection Guidelines

RESULTS

Table 1. Effect of under 10 different temperature conditions on germination

Temperature(°C)	Germination percentage(%)
25/5	17.5±4.8
25/10	47.5±4.8
25/20	40.0±5.8
25	50.0±10.8
20	52.5±16.0
15	15.0±2.9
20/15	27.5±10.3
25/15	47.5±7.5
30/15	45.0±6.5
35/15	37.5±6.3

- Immediately after initial collection, the seeds of *A. nephrolepis* had a relative humidity of 43% and showed the highest germination rate of 52.5% under the condition of 20°C (constant temperature).

Table 2. Effect of total viability and Moisture contents of *A. nephrolepis*.

eRH(%)	Moisture content(%)	Germination percentage(%)	Total viability
15	4.33±0.14a	49.0±5.8ns	50.0±5.8ns
20	4.32±0.07a	44.0±10.5ns	45.0±11.0ns
30	5.92±0.05b	46.0±1.0ns	47.0±3.4ns
40	5.74±0.10b	38.0±5.0ns	38.0±5.0ns
50	7.03±0.29	46.0±12.1ns	46.0±12.1ns

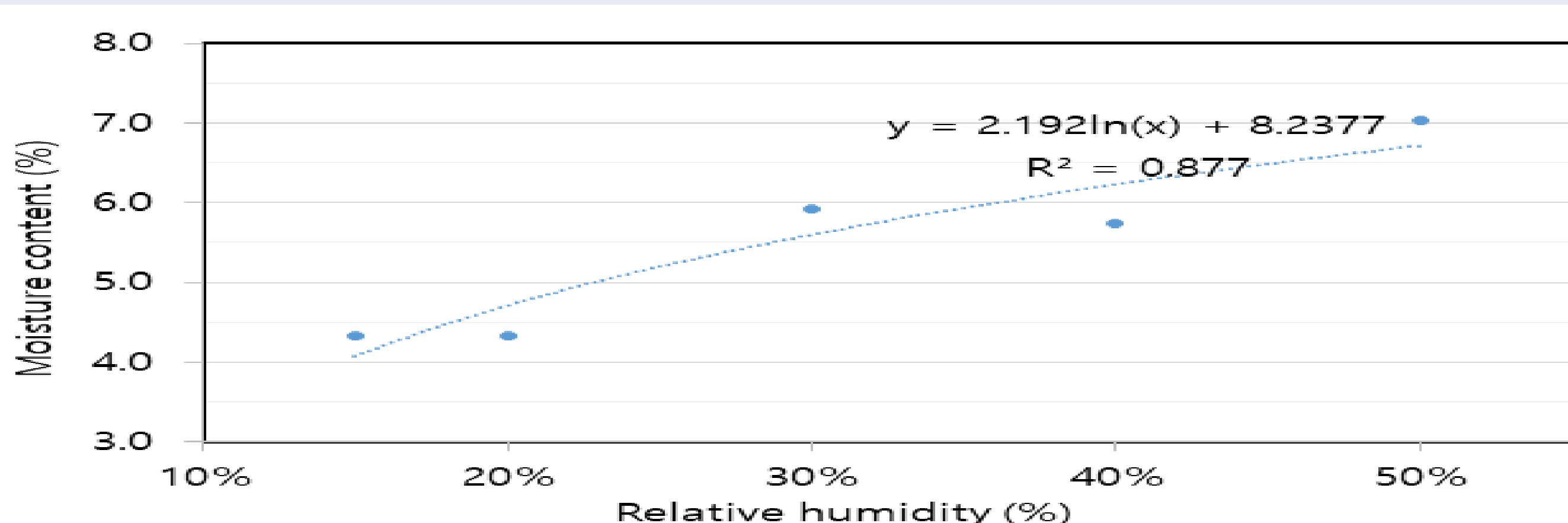


Fig 2. Moisture content graph by relative humidity

- No loss of viability could be confirmed in the seed of *A. nephrolepis* at low relative humidity.
- The moisture content of the seeds of *A. nephrolepis* by condition was 4.32 ~ 7.03 %, which showed a tendency to increase with the relative humidity, but the moisture content did not increase as dramatically as other seeds.

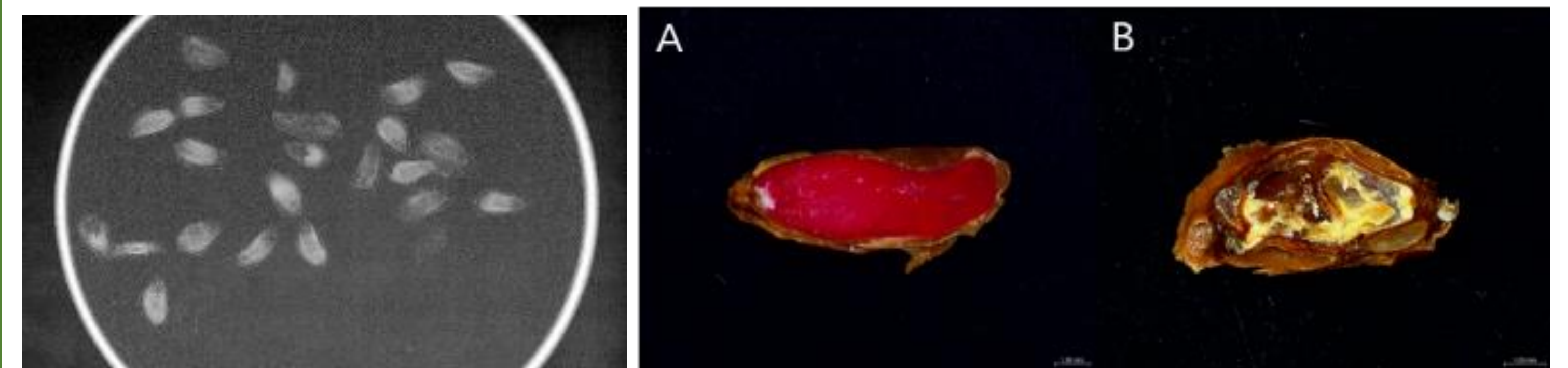


Fig 3. X-ray of *A. nephrolepis* Fig 4. TZ test of *A. nephrolepis* (A: Viable. B: non-viable)

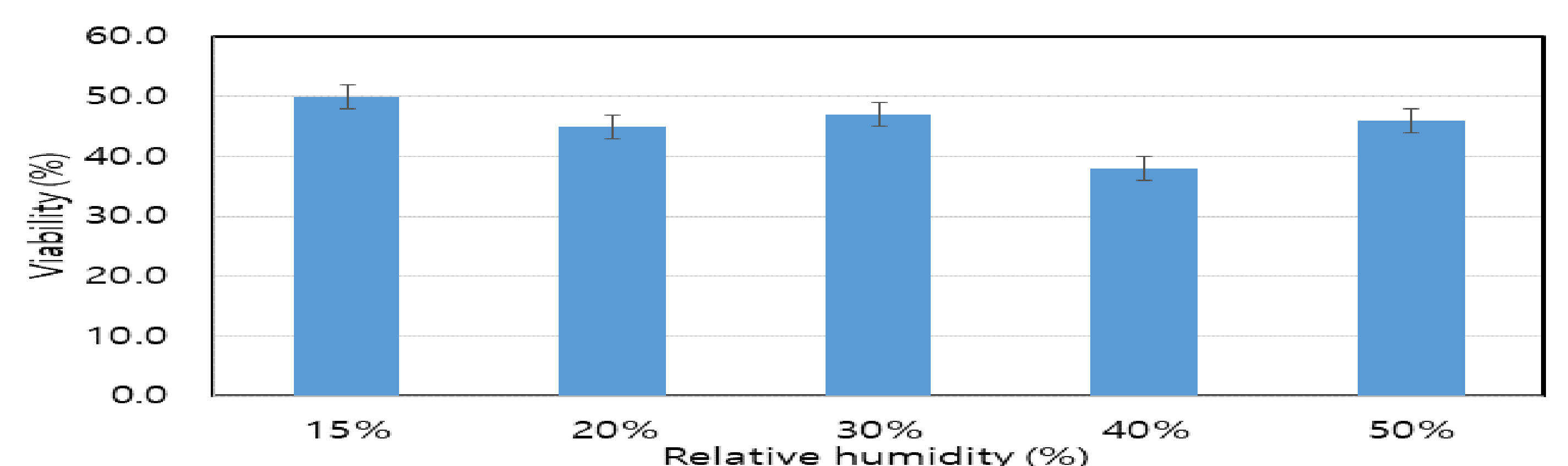


Fig 5. Viability graph of Moisture content

- The collected seeds showed no statistically significant difference as a result of the viability test after checking the moisture contents of the seeds in 15, 20, 30, 40, 50% eRH conditions. Therefore, it could be confirmed that the seed of *A. nephrolepis* had resistance to drying.
- It could be confirmed that *A. nephrolepis* shows the behaviors of an Orthodox seed, and it can be stored under long-term storage conditions (-20°C, RH40% or less) after drying. After storage at -20°C for 3 months, we plan to conduct a verification experiment to verify viability.